

SECTION 15940 - SEQUENCE OF OPERATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes control sequences for HVAC systems, subsystems, and equipment.
- B. Related Sections include the following: Division 15 Section "HVAC Instrumentation and Controls" for control equipment and devices and submittal requirements.

1.3 BOILER AND DHW CONTROLS

- A. Program the Tekmar controller.
 - 1. Boilers operate lead/lag, alternate lead boiler on a weekly basis. If lead boiler fails second boiler starts. If second boiler fails, third boiler starts. If lead boiler does not maintain common loop set point 190 F (adj), second and third boilers start in sequence as necessary to maintain loop temperature setpoint – common loop setpoint shall have adjustable setpoint differentials to optimize boiler staging without short cycling.
 - 2. Reset Schedule: Control secondary heating loop water supply temperature, by modulating temperature reset mixing valve, in straight-line relationship, for the following conditions:
 - a. 185 deg F heating water when outside temperature is zero deg F.
 - b. 140 deg F heating water when outside temperature is 75 deg F.
 - 3. Control of Main Circulating Pump: Energize pump at outside temperatures below 65 deg F.
 - 4. Control of Blend Pump: Energize pump whenever either boiler operates.
 - 5. Domestic water heating pump pull in parallel with the heating pumps, from the boiler header. This pump shall cycle as required by the DHW system aquastat, delivering 190-F boiler water to heat the domestic water.
 - 6. Domestic Hot Water Recirc. Pump:
 - a. Pump operates continuously.
 - b. Stop pump if domestic supply from hot water tank sensor rises to 150°F (adj). Manual reset is required to start pump.

1.4 TERMINAL UNIT OPERATING SEQUENCE

- A. Unit Heaters and Cabinet unit heaters, Hydronic: Room thermostat opens 2-way control valve and cycles fan. Control valve closes and fan stops, when space temperature is at set point.
- B. Radiators: Room thermostat modulates 3-way control valve.

1.5 VENTILATION SEQUENCES

- A. Boiler Room:
 - 1. If the boiler room drops below 65°F, the boiler room unit heater shall be energized.
 - 2. If the boiler room gets to 75°F, the boiler room outside air damper shall open and the exhaust fan shall be energized.
 - 3. If the Carbon Monoxide detector is activated, the boiler room outside air damper shall open and the exhaust fan shall be energized, alarm.
- B. Central Bathroom Exhaust Fans: Time clock shall cycle the fans; shut off fan at night in accordance with owner selected occupancy schedule. Locate the time clock in the ground floor janitors closet.
- C. Carbon Monoxide Alarm: locate in boiler room; connect to fire alarm system.
- D. Energy Recovery Ventilator
 - 1. Time clock shall cycle the fans; shut off fans at night in accordance with owner selected occupancy schedule. Fresh air and exhaust air motorized dampers (fail-closed) shall remain open during fan operation and closed during night shutdown.
 - 2. Fans energize subject to damper end switches.
 - 3. Heating coil control valves shall modulate to maintain a 72°F discharge air temperature to the conditioned spaces. Heating control valve shall fail open on a loss of power and during night shutdown.
 - 4. Freeze protection is by capillary tube thermostat with manual reset mounted on the discharge of the unit. When temperature setpoint 40 F (adj) is detected the fans stop, EA and OA dampers close 100% and the heating control valve opens 100%.
- E. SPLIT AIR CONDITIONING UNITS
 - 1. AC units operate by manufacturer supplied controls.
 - 2. AC units cooling setpoint is 75F (adj).

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 15940